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Mounting arrangement and method of mounting elements on the inner lining of refrigerators and/or freezers and method of producing such mounting arrangement

This invention relates to a method of producing a mounting arrangement for mounting elements, in particular pull-out rails, on the plastic inner lining of a thermally foam-insulated wall of a refrigerator and/or freezer, a mounting arrangement and a mounting method for mounting elements on the inner lining of a thermally foam-insulated wall of a refrigerator and/or freezer, and a refrigerator and/or freezer with pull-out rails which are mounted on the inner lining by means of such mounting arrangement.

Especially in the construction of refrigerators and/or freezers, thin-walled inner linings made of plastics are used as inner and outer walls, the space between inner lining and outer wall being thermally insulated by means of foam which is foamed between the walls. On the inner wall, e.g. rails for supporting trays or other fastening elements are mounted. When mounting heavier elements, stability problems arise due to the thin-walled design of the inner lining, when e.g. a corresponding fastening element is screwed into the inner lining.

For mounting such parts in the cooling chamber, it is known to provide separate mounting plates on the back of the inner wall, which can, for instance, also be foamed in. The element to be mounted is then screwed to such mounting plates by means of screws extending through the inner lining. In the known solution, the manufacturing effort therefore is very high. In addition, the inner lining must be pierced on one or more points, which impairs the quality of the thermal insulation.

It is the object of the present invention to provide methods of producing a mounting arrangement, mounting methods, a mounting arrangement, and a refrigerator and/or freezer, by means of which a safe and easy mounting of elements on the plastic inner lining of a refrigerator and/or freezer wall is made possible. This object is solved by manufacturing methods with the features as stated in claim 1 or claim 2, by a mounting method with the features as stated in

claim 6 or 7, by a mounting arrangement with the features as stated in claim 10, and by a refrigerator and/or freezer with the features as stated in claim 16. The sub-claims are directed to advantageous aspects.

In the method of the invention, the outer contour of the element to be mounted is at least partly reproduced in the plastic inner wall of the refrigerator and/or freezer. In this way, a safe retention of the element to be mounted is ensured. Without additional screw connections or fastening elements, the element to be mounted is already supported and retained in the inner wall. By reproducing the outer contour of the element to be mounted, there is furthermore ensured a design which is advantageous in terms of optical appearance and saving in space.

A mounting arrangement produced in this way is particularly suitable for mounting pull-out rails for pull-out trays or pull-out drawers, in which great loads must be borne as a result of the mounting to the inner wall.

For producing a corresponding mounting arrangement, the inner lining is fabricated of thin-walled plastic material with a receiving contour which is shaped such that on at least three sides it at least partly corresponds to the outer contour of the element to be mounted, whereby the element to be mounted can be received by the receiving contour. After this manufacturing process, the element to be mounted is inserted into the receiving contour. Together with the element to be mounted, which has been inserted into the receiving contour, the inner lining is subjected in a manner known per se to the foaming process for incorporating the foam insulation between the inner lining and an outer wall of the refrigerator and/or freezer. As a result of the foaming process, the inner lining, which as such has little stability and flexibility, is supported and strengthened and thus provides a safe support for the element to be mounted. The inserted element to be mounted thus is enclosed.

In another aspect of the method of the invention, the element to be mounted is already inserted into the manufacturing tool, so that during the manufacturing process of the plastic inner lining the outer contour of the element to be mounted is reproduced. As a result of the foaming process, the inner lining is again strengthened and supported, so that the element to be mounted is fixed.

The inner lining can be produced in different ways. For instance, the inner lining can be injection molded as a thin wall. Particularly advantageously, the inner lining is drawn, in particular deep-drawn. In the present text, the term "deep-drawing" is used as a synonym for other drawing processes.

By means of the method of the invention, mounting arrangements can be produced which do not require any further accessories for mounting. An intimate connection is possible without mounting tolerances, which is also suitable for accommodating high bearing forces and hence for utilizing great bearing surfaces. Since the element to be mounted is at least partly received in the receiving contour of the inner lining, an advantageous usable space is obtained in the cooling chamber, and hence an optically appealing appearance. This is in particular true when the receiving contour is so deep that the element to be mounted can completely be received therein and hence comes to lie substantially flush in the inner wall. Such aspect also provides advantages when cleaning the apparatus.

The element to be mounted can for instance be adhered to the receiving contour. In another aspect of the method, one or more snap-in cups are formed inside the receiving contour during the manufacture of the inner lining, which snap-in cups can receive correspondingly shaped latching noses on the element to be mounted and thus serve to hold the element to be mounted in the receiving contour. In the case of service, for instance, such aspect provides for an easy removal of the element to be mounted. Such snap-in cups can also be advantageous when an element to be mounted must be replaced subsequently, for instance in the case of service.

In a particularly advantageous aspect of the method of the invention, the receiving contour in the inner lining is, however, configured such that it has an undercut which at least partly encloses the element to be mounted. For this purpose, the element to be mounted can for instance be clipped into the undercut receiving contour in the already fabricated plastic material of the inner lining prior to the foaming process. Before the foaming process, the thin-walled plastic material of the inner wall is flexible and has little stability, so that clipping in can be effected easily. After clipping in, the foaming process is performed, which supports and strengthens the inner wall from inside, so that a positive, firm enclosure of the

element to be mounted is ensured. As a result of foam pressure and curing, an intimate connection is obtained.

The element to be mounted likewise can be inserted into the manufacturing tool by means of which the inner wall is fabricated, whereby the undercut enclosing the element to be mounted can be formed. In such an aspect of the method of the invention, a positive retention of the element to be mounted thus is obtained during the manufacturing process, which positive retention is intensified and strengthened by the foaming process.

Independent protection is also claimed for corresponding mounting methods by means of an undercut receiving contour. The advantages of such mounting methods of the invention can be taken from the above description of the corresponding manufacturing methods of the invention.

In all embodiments in which undercut receiving contours are used, a replacement of the mounted elements retained in the strengthened foamed inner wall as a result of the undercut can easily be effected in the case of service. The elements to be mounted, e.g. pull-out rails, can be pulled out of the undercut groove or be pressed into the same by applying force. Due to the foam elasticity and the thin-walled character of the inner lining, this can easily be performed with a corresponding application of force.

A mounting arrangement in accordance with the invention for mounting elements on the inner lining of a thermally foam-insulated wall of a refrigerator and/or freezer includes a receiving contour in the inner lining of the refrigerator and/or freezer, which at least partly corresponds to the outer contour of the element to be mounted such that it can positively or non-positively receive the element to be mounted. The advantages of such mounting arrangement and its particular aspects in accordance with the sub-claims have already been described with reference to the inventive manufacturing method for the mounting arrangement.

Particularly advantageously, the manufacturing methods of the invention can be used to create a mounting arrangement for pull-out rails in refrigerators and/or freezers. The elongate design of pull-out rails is particularly useful for the positive or non-positive contact in the receiving contour of the inner lining. The positive or

non-positive contact of the elongate pull-out rail ensures a safe retention despite the often great bearing forces of pull-out rails. Such pull-out rails can be used, for instance, to pull out corresponding supporting trays or pull-out drawers.

A mounting arrangement for pull-out rails in accordance with the invention can additionally comprise a pull-out stop, which is configured such that it prevents the fixed part of the pull-out rail from being shifted in pull-out direction. It is thus ensured that during the normal operation of the pull-out rail the fixed part remains fixed and cannot slide back and forth in the receiving contour.

Such pull-out stop can, for instance, be formed by correspondingly arranged protruding portions in the receiving contour, which engage in correspondingly shaped openings in the fixed part of the pull-out rail. In another embodiment, the fixed part of the pull-out rail is enclosed by the inner lining also at its ends, so that lateral shifting is impossible. Such pull-out stop elements can be shaped when fabricating the inner lining.

Subsequently, the invention will be explained in detail with reference to the enclosed schematic Figures, in which:

Figure 1: shows a cross-section through a mounting arrangement in accordance with the invention, and

Figure 2: shows a cross-section through another embodiment of a mounting arrangement in accordance with the invention.

Figure 1 shows the cross-section through a mounting arrangement in the inner lining or inner wall 1 of e.g. a refrigerator and/or freezer. On the outside of the inner wall 1, the foamed thermal insulation 3 is provided in a manner known per se. The receiving contour 15, which is formed in the plastic inner wall 1, positively incorporates the fixed part of the pull-out rail 5, which is shown here in cross-section. In the pull-out rail 5, which is retained by the positive connection with e.g. the beads 13, a movable pull-out rail 7 with a supporting device 9 for a pull-out tray or pull-out drawer is running via bearings known per se, e.g. ball bearings or other roller bearings 11.

The pull-out rail 5 substantially is mounted flush, so that cleaning the inner wall 1 is easily possible. Due to the fact that the pull-out rail 5 is received in the inner wall 1, the space available in the cooling chamber is enlarged and optically more pleasing than in the case of mounting the pull-out rail on a planar inner wall.

For producing the mounting arrangement of Figure 1, the plastic inner wall 1 is shaped in a deep-drawing process such that it has the cross-sectional shape as shown in Figure 1. Subsequently, the prefabricated pull-out rail 5 is clipped from the right-hand side of Figure 1 through the constrictions 13 into the flexible inner wall 1 having little stability. Then, the inner wall is processed in a manner known per se in the further production process of the refrigerator and/or freezer. In particular, by means of an outer wall not shown in Figure 1 and the inner wall 1 a cavity is created, which is filled with foam 3 for thermal insulation. By means of this foaming process, the receiving contour 15 in the inner wall 1 is supported and strengthened from outside, so that the pull-out rail 5 is retained.

In an alternative production process, the pull-out rail 5 is placed onto the inner wall lining 1 not yet deep-drawn, and during the deep-drawing process is used as a mold for the receiving contour 15. In such a method, the pull-out rail is already retained in the inner wall lining 1 after the deep-drawing process and is then strengthened and stabilized from the back of the inner wall 1 by the foaming process for the foam 3, as described above.

The embodiment of Figure 2 shows a cross-section through a differently shaped receiving contour 115, in which a number of snap-in cups 21 is formed along the direction vertical to the plane of the Figure. A pull-out rail 5 equipped with corresponding latching noses 23 can be inserted into the receiving contour 115 in the direction of the arrow and can be retained by the connection of latching noses 23 and snap-in cups 21. Such aspect in particular provides for an easy replacement of the pull-out rail 5, e.g. in the case of service.

In such an embodiment, it can alternatively be provided that a latching nose 23 extends along the pull-out rail 5, and the snap-in cup 21 extends like a groove vertical to the plane of the Figure.

The embodiments of Figures 1 and 2 can of course also be combined with each other, so that a mounting arrangement is provided by a positive retention of a pull-out rail 5 enclosed by an inner wall lining 1 with an additional fixation by latching noses 23 in snap-in cups 21.